Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THEME SUBJECTS FOR ENGINEERING STUDENTS

SADA A. HARBARGER
University of Illinois

In my opinion, rhetoric is taught the engineering student for two reasons: (1) so that he may be able to express himself accurately and concisely in other courses throughout his college career, and (2) so that he may get some preparation for later writing in his profession. In other words, I believe that he needs to relate and to carry over the practice in rhetoric to his general course, and that he should be led to see that there is a demand in his profession for accurate writing. Indeed, were it possible, I should like to have rhetoric considered as an auxiliary course to all others which the engineering student takes throughout his four years in college. Since the problem has seemed to me one of arousing and of maintaining in the student a desire to write, one way of securing this wish might be to use his own knowledge and his special interests as a point of departure.

The immediate reason, however, which led me to gather a list of subjects which were related to engineering was the great amount of time which students are forced to spend in collecting material and in writing the three or four long themes, varying from 600 to 2,000 words, which are required during the year's course in rhetoric. These themes, upon which the student spends an average of fourteen hours each, ought, in my opinion, to give him something more than practice in writing. They should be of such a nature that the student will have some purpose in getting the information. True, any subject ought to be worth while, but its worth is not always evident to the student. And certainly it is not hard to understand why an instructor gets better results if he makes his assignments concrete than if he makes them abstract. In order to save the student some time as well as to arouse him perhaps to attack his theme with enthusiasm, (1) because he knew something about it before he began to investigate and wished to inform himself further and to organize his information; or (2) because he was given the opportunity to inform himself upon an unfamiliar subject connected in some way with his specific course—that subject which he intended to look up when he had the time—I have considered it valuable to assign theme topics which were related to his individual interests. For it is my opinion that we have approached from the wrong entrance the teaching of rhetoric to students with special interests. We have allowed a student to declare his intentions, whether he will be a civil, an electrical, or a mechanical engineer, the very first day he enters the university. Yet we straightway proceed to tell him that he must not consider his choice or any interests especially allied to it during the first two years of his course. We harp on general culture until it seems to him that he delves everywhere but into his chosen field; and that problems in this field are to be avoided as the plague. Small wonder it seems, therefore, that he should be opposed to rhetoric. In my opinion, we must advance toward broader culture through specialization; consequently we must not fail to recognize its demands and its rights. And an appeal to the student's special interests can be made the means of approach if the instructor in rhetoric is able to point out skilfully the broader aspects which may lead to this much-desired general culture.

The purpose of a Freshman course in rhetoric, I take it, is to awaken in the student a desire to express himself—to have something to say that just must be told; that is, besides giving the student a knowledge of correct written and spoken English, to get him to express himself because he has something to say. Thus it seems to me that unless the instructor studies the interests of his students, and makes the approach to rhetoric through these avenues, he cannot hope for more than a perfunctory fulfilment of the requirements of the course. This latter spirit cramps and retards, rather than stimulates and develops, the student.

To overcome, if possible, the half-hearted interest on the part of engineering students, I have adopted the plan, even in the short themes, of including some subjects—one or two—that have some relation to their interests; for instance, "The Value of the Engineering Lecture," "My Ideal Engineer," "My Favorite Engineering

Magazine," etc. The assigning of such subjects has never precluded any student from selecting another subject unrelated to engineering if he wished, and if he talked it over beforehand with the instructor. It is very rare, however, for a student to select an unrelated subject, because he does have some special interest about which he is willing to talk. Yet one is not to understand that a discussion of some special interest means a narrowly technical discussion, though one will discover a few narrowly technical subjects in the list. What I mean by the discussion of some special interest is the handling, within the capabilities of the writer, of the broad aspects of his profession. Granted that the students who take rhetoric are usually Freshmen and Sophomores whose experience and reading are very limited, yet within their limitations they are able to discuss in a rather animated fashion their interests, and are willing to take time, if given the opportunity, to develop them further.

I asked, therefore, that each one who suggested subjects should submit simple, non-technical themes that would be of interest to Freshman and Sophomore engineering students and within the range of their experiences and desires. The response from members of the engineering faculty has been very gratifying. I have grouped these subjects under the various forms of discourse rather than under the various courses in engineering. I believe that the relation of the subjects to the specific course in engineering is apparent enough to require no special arrangement. My reasons for assembling these subjects under the various forms of discourse were two: first, I wished the students to realize that these subjects were considered as forms of discourse which were referred to in their textbook; secondly, I wished them to see that there was a reason for studying how to use effectively these forms of discourse—a reason which was appreciated by members of the faculty of the College of Engineering. This list of subjects naturally represents the individual tastes of those who submitted them, and also suggests what they think ought to be stressed by those who teach engineers non-technical subjects. Some of these, perhaps, are too difficult to be treated adequately by the average student; yet it has not seemed to me that they should be struck out. Some subjects, even though they may be beyond the student, are stimulating, for they often suggest to him some phase of a complex subject which he is capable of handling. Some may seem too technical; yet I believe that the handling of even one or two of these technical subjects is not going to make or keep a student a narrow-minded man. Few students, however, have the desire to select a narrowly technical subject. If a student does so, the instructor can treat the case as an individual one, for my experience has been that the student who makes such a selection is the one who is not widely read and never will be; one who has a hard time in meeting the lowest requirements of the course. If the use of the technical subject can be made a means of sustaining his interest, it should be allowed. He would not gain broadness by a non-technical subject, for he would be utterly at sea, and no amount of sending him to discussions of general subjects would ever make him a man with vision. But even if a technical subject is not chosen, the general effect of offering it when the student is making the selection of his subject for a theme on which he is to spend from four to eighteen hours is not to be ignored. He has more respect for a course which suggests that he is interested in his profession by submitting for his consideration topics which are thought worthy of attention by men who lead in his own college. Thus some connection is established with his specific interest at a time when he is likely to feel that there is none.

Besides the psychological effect which these subjects exert on the student there is the effect that they may have upon the instructors in various engineering courses. The very fact that they have taken time to consider the simplest problems in their own field has made them more interested in establishing a connection between their work and that of a subject which is often quite unrelated, but which may be made a strong factor in increasing interest in their courses.

From the point of view of the teacher of rhetoric it is profitable to use these subjects, because they may create an interest and a willingness to write, a result that he would otherwise find it impossible to get, especially with the more mature students. He wins the good-will of his students because he respects their interests enough to give them recognition. These are the reasons why I believe that teachers of engineering students can be helped by referring to the following subjects when announcing topics for themes. In some cases I have left the topic as it was submitted to me; in others, I have rephrased it to suit my needs.

In conclusion, I wish it understood that my purpose in collecting these subjects was not to make engineers narrow specialists, but to build upon something which the student already had, a superstructure which would supply more than his professional needs. An attempt, therefore, to keep students within their own field does not necessarily make them narrow specialists. Indeed, it is my opinion that it is likely to create the opposite effect. For by their interest in their own work they are led to recognize its relation to other professions and to gain thereby that quality which professional critics of the college-bred engineer think he lacks—breadth of view.

EXPOSITION

1. What is ore?
2. The story of the Davy safety lamp.
3. A short history of the various methods used in illuminating a mine.
4. Proper illuminating of factories, residences, buildings.
5. Significant discoveries and inventions.
6. Lumbering.
7. The railroads of South America.
8. Business opportunities in South America.
9. The continental railroad
10. Building materials of South America.
11. The uses of the motion picture.
12. Summer military camps.
13. The organization of the army.
14. Military map making.
15. Map reading.
16. Trench construction.
17. Field engineering.
18. Military bridges (see *Manual of Field Engineering*).
19. The development of the iron industry; its history and economic significance.
20. The development of the steel industry; its history and economic significance.
21. The machine tool industry.
22. The development of cotton spinning and weaving.

23. The development of the cotton gin.
24. The development of the manufacture of the agricultural implement.
25. A history of the development of the harvester, of the reaper, etc.
26. The development of high-speed steels and its effect upon manufacturing industries.
27. The development of transportation by land and sea in America.
28. Methods for the payment of labor.
29. The developments in aviation during the past ten years.
30. Some simple causes for mine explosions.
31. Mine ventilation.
32. How to use the *Engineering Record.*
33. Systematic timbering as a means for preventing mine accidents.
34. How can haulage accidents in mines be prevented?
35. The foreigner as an asset to industrial communities.
36. Hollow-tile floor construction.
37. Flood prevention.
38. Recent slides in the Panama Canal.
39. Concrete construction in cold weather.
40. New forms of brick pavements.
41. Methods of study.
42. The new New York terminals.
43. Recent methods of velocity measurement in closed conduits.
44. The construction of the Elephant Butte dam.
45. The Arrowrock dam.
46. What is the effect of a year of drought on the prosperity of the people of Illinois?
47. What methods do the engineers propose for the regulation or control of floods?
48. Who owns the water which flows in a natural stream?
49. What is irrigation and how is it practiced?
50. How are irrigation and water-power developments related?
51. In what way should an engineer repay any obligations to the people who have contributed to his education?
52. Relative merits of railroads and inland waterways.
53. What is the value of pure water for domestic, municipal, and manufacturing purposes?
54. Social problems in construction camps.
55. The ideals of an engineer.
56. The engineer as a citizen.
57. Opportunities of the engineer, aside from purely technical pursuits.
58. Colonel Goethals—the ideal type of engineer.
59. The business side of engineering.
60. Why have you chosen engineering as a profession?

61. What qualifications have you for a successful engineer?
62. What, in your opinion, is the formula for success in engineering?
63. Why is imagination an asset to the engineer?
64. In what respects has your college course failed to give you an all-round engineering training?
65. Why is the bright fellow without a college training able to compete successfully with the average college man?
66. Why is George W. Goethals a successful engineer?
67. Why does the world in general consider that the college man is "technical" or "theoretical" rather than "practical"?
68. What is the ultimate object of engineering?
69. Is the opinion of an engineer twenty years out of college of more value than that of the young graduate? If so, why?
70. Is it necessary for the technical graduate to "start at the bottom"? Why?

BIOGRAPHIES

71. BESSEMER, SIR HENRY. A versatile inventor noted chiefly for his discovery of the Bessemer process of making steel. Among his noted inventions were: the process of making bronze powder; a perforating machine for canceling revenue stamps. Among his ignoble failures are: an attempt to keep the cabin of an ocean-going steamer level by means of pistons working in cylinders containing oil or water; an attempt to keep the cabin of an ocean-going steamer level by the use of the principles of the gyroscope.
72. COOPER, PETER. A man of great versatility who is perhaps not properly called an engineer, but who deserves the attention of engineers because of three works in which he had a leading part: the rolling of the first I-beam, a form of material much used in structural work; the making with his own hands of the first locomotive to run in America, in connection with which are a number of very interesting facts; he was very influential in the work of laying the first Atlantic cable.
73. EADS, JAMES B. Noted as the builder of the steel arch bridge at St. Louis, the first bridge in which steel was used, and the first bridge in America founded upon pneumatic caissons; the builder of the first jetties at the mouth of the Mississippi River. In some respects his most noted achievement was the building of six or eight entirely new types of river gunboats during the Civil War in an inconceivably short time. He is noted for one great failure, viz., the proposal to carry ocean-going ships across the Isthmus of Tehuantepec upon a cradle supported upon innumerable car trucks on many railroad tracks.
74. ERICSSON, JOHN. A Swede of great precocity, and an inventor of many important engineering devices, chief among which was the invention of the "Monitor," which destroyed the "Merrimac," during the Civil War.

75. FULTON, ROBERT. An artist and an engineer. Usually asserted to be the first to run a steamboat. Really he was the first to commercialize the steamboat, but certainly two or three others ran steamboats before he did.
76. HOLLEY, ALEX. L. A very brilliant engineer who deserves great credit for his work in applying power to the various manipulations in the manufacture of Bessemer steel. Without him the Bessemer process would have been much longer in reaching its zenith.
77. MACADAM, JOHN L. A noted British road-builder who lived in New York City during the American Revolution. He should be commended for his ability as a road-builder and for his unrequited public service. It would be interesting if the essay could give some information about the condition of roads in England, and the effect when Macadam began to study roads.
78. STEVENS, COL. JOHN, AND TWO OF HIS SONS. A brilliant family noted for many important inventions in various engineering fields.
79. WATT, JAMES. A prolific inventor, chiefly in connection with the steam-engine. An engineer writing a biography of this man should tell something about the condition of the steam-engine when Watt began his inventions and also something of the relative conditions of the steam-engine now and as Watt left it.
80. G. W. GOETHALS.
81. ALVA V. EDISON.
82. C. P. STEINMETZ.
83. D. L. BURNHAM.
84. WESTINGHOUSE.
85. The WRIGHT BROTHERS.
86. GEORGE S. MORRISON. References: Smile, *Lives of Engineers;* Andrew Carnegie, *Life of James Watt;* Roe, "American Engineers," *American Machinist*, 1913–15.

DESCRIPTION

87. CATSKILL AQUEDUCT OF NEW YORK CITY. The aqueduct consists of an impounding reservoir in the Catskill Mountains and a conduit something like ninety miles long. The reservoir in the Catskill is made by a gigantic dam known as the Ashokan Dam. Along the aqueduct are two or three other reservoirs with large dams. An especially noteworthy feature of the work is the deep inverted siphon under the Hudson River near Storm King.
88. KEOKUK WATER-POWER DEVELOPMENT. The largest water-power development in the world. The dam is situated between Keokuk, Iowa, and Hamilton, Illinois.
89. UNITED STATES RECLAMATION SERVICE. How is the money obtained for the engineering construction required? How is the United States

government reimbursed for its expenditures? Enumerate some of the projects, and describe whether the water is obtained by damming a stream or by pumping. Also describe the dam and tell whether it is masonry or earth, and give some of its dimensions. Describe the method of leading the water from the reservoir to the land.

90. SALTON SEA AND INFLOW OF THE COLORADO RIVER. Describe the eight or nine attempts made to compel the Colorado River to flow again in its banks after it had escaped through an opening made in them to obtain water for irrigation. Describe the location and peculiar feature of the Salton Sea and the effect of the inflow of the Colorado River. If the story is well told, it can be made as exciting as an Indian tale.
91. WOOLWORTH BUILDING, NEW YORK CITY. Describe this, the highest structure in the world, remarkable for the quantity of material in it and the rapidity with which it was constructed.
92. My own idea of the steps necessary to select the preliminary location of a line for a railroad.
93. My own idea of the things which must be taken into consideration in locating the site for a water-power development.
94. Describe the complete construction of a railroad from the beginning.
95. Describe the complete construction of water-power development from the beginning.
96. Give a description of the experiences you may have had in a surveying party.
97. Give a description of the experiences you may have had on a canoeing trip.
98. Give a description of the experiences you may have had working in a machine-shop.
99. Write an explanation which would be clear to a non-technical man of what actually takes place from the time you crank an automobile until you are driving along the road in high gear. (Use sketches when necessary.)
100. Give your own idea of what drives a locomotive; that is, from the time the fireman builds the fire in the boiler until the locomotive is in operation. (Use sketches if necessary.)
101. Outline what would constitute a good, complete, and economical equipment for two boys to take on an automobile trip in a five-passenger touring car from Urbana, Illinois, to Boston, Massachusetts. Equipment must be complete for camping at night and preparing meals along the road. Give estimate of cost of equipment and trip.
102. The same as No. 101, from Urbana, Illinois, to Denver, Colorado.
103. If you were delegated to show a prominent engineer (civil, mechanical, electrical, architectural, or mining) the points of interest at the University of Illinois in one-half day, describe in detail what you would show him.

104. Describe the processes involved in the preparation of the drawing-room plates received from your instructor in G.E.D. 2, under the heading: "How a plate of problems in descriptive geometry is prepared."
105. Three themes to be presented; about 500 words each; serially arranged under following subtitles:
    a) Raw material up to the paper-mill doors.
106. *b*) Conversion into paper.
107. *c*) Preparation of etchings and printing.
    References to be secured from the G.E.D. instructor, and handed to the rhetoric instructor to be supplemented if insufficient.
108. These three themes should then be read by a fourth student and a 500–1,000 word summary made by him. Some shorter themes made to fill in the chain of processes might be profitable. These themes might well take the form of reports to a chief and his report to the instructor.

ARGUMENTATION

109. Army versus civil engineers.
110. What can one learn from a foreign student?
111. Is it wise for an engineer to know Latin-American literature?
112. The things of most value to be obtained from an engineering education.
113. Our ignorance of the geography of neighboring countries.
114. The value of a foreign language to a technical student.
115. Should engineers be licensed by the state?
116. Should the river and harbor improvements made by the United States government be under the direction of the army engineers or of civilian engineers?
117. Who should bear the expense of first-aid training?
118. The disadvantages of foreign miners.
119. Should the government permit pooling of operators to control the selling price of coal?
120. Is welfare-work a financial success?
121. The advantages of industrial education for miners who work at the face.
122. Is engineering a lucrative profession?
123. To what extent is the engineering student justified in engaging in student activities?
124. What are requisite essentials for success in engineering?
125. Should the engineering student work for high grades?
126. Engineering education as a preparation for life.
127. Is it essential that engineers should be able to handle men?
128. Why should students join student societies?
129. Why a foreman or a superintendent must be a teacher.
130. Why engineering appeals to me.

131. Why rhetoric is useful to the engineer.
132. Is the hardship of searching for gold in Alaska compensated by the reward?
133. What is the effect of the nationality of mine employees on accidents in mining?
134. Is it advisable for a state to educate its mine employees?
135. What is the justification for saving only about 50 per cent of the coal in the ground by present mining methods?
136. Should gasoline locomotives be prohibited in mining?
137. Is it necessary to prepare as many sizes of coal as is ordinarily done at the present time?
138. Should the present mining code of the United States be revised?
139. Is it wise to use a bonus system of payment in mining?
140. Does it pay to make coal briquets?
141. Is the "jitney bus" a satisfactory substitute for the street car?
142. Should the "jitney bus" companies be required to meet the same franchise and tax regulations as are imposed upon a competitive street railway?
143. What is the effect of the interurban railway in developing farming land in Illinois?
144. Should the railways be placed under government control in time of war?
145. Would a system of canals and waterways in the Mississippi Valley probably pay for their cost?
146. Will the competition of the parcel post with the express companies result in the long run in benefits to the public?
147. Is our public-school system doing what it should to train men for railway service?
148. Does a career in the railway service offer adequate opportunities and satisfactions?
149. Do forests have an influence on rainfall, or on the water flowing in streams coming from forests?
150. Is rainfall in Illinois increasing or decreasing year by year?
151. Is irrigation useful in Illinois?
152. What are the benefits of drainage?
153. The duty of an engineer as a citizen—has he larger moral obligations to the state because his education is obtained largely at public expense?
154. Should an underclassman be obliged to attend the meetings of the student mining society?
155. Should a student be required as part of his school experiences to take inspection trips to points of interest in his future profession?
156. In foreign countries all coal and minerals are the property of the government and a source of income to all the people. In the United States they belong to the individual owner. Which is better?

157. Should the government license mining engineers?
158. The value of mineral products in the United States is greater than any other class of commodities, excepting only agricultural. Should the United States government cabinet not have a secretary of mines as well as a secretary of agriculture?
159. A mining company starts operations; immediately a town springs up near the place. Subsequent mining operations damage the town or the great surface plants pollute the streams. Since the existence of the town is dependent on the successful operation of the mine and plant, why allow property-owners to collect huge amounts of money from the company for damage done?
160. The state university should analyze all minerals, ores, and coal free of charge when submitted by private individuals.
161. All mining engineering students should subscribe to, and faithfully read, one or two good mining papers.
162. To conserve the mineral supply, which cannot be replaced when gone, the government should establish minimum prices for all products of the mines.
163. Why is the course in architecture better than the course in law?
164. Is there enough time spent upon drawing in the present course in architecture?
165. Does the practical application of descriptive geometry justify the time spent upon the course?
166. Why should Freshmen begin to collect information for their library, and which system of filing is the best and why?
(Numerous articles have appeared this year in engineering magazines about the architect or engineer and his library. Several systems are in use, a few of which are: (1) to subscribe to all magazines, have them bound and put on shelves; (2) to make a selection of the best magazines, after careful investigation of those desired, bind, and then index articles, using some card system; (3) to subscribe to a few high-grade magazines, cut out leading articles, and file either loose in envelopes or in scrapbooks, with a corresponding index.)
167. Why are the so-called "non-technical" subjects, such as English, rhetoric, language, etc., of benefit to the student in architecture?
168. How can you plan on studying to a better advantage and why don't you do it?
169. How should the rhetoric you take in college be of a very distinct advantage after graduation?
(Draftsmen, tracers, men of all trades are asked to submit estimates, reports, recommendations to their employers. Occasionally a good man is not promoted or recognized because of his inability to use the English language properly.)

170. Diesel oil locomotives for suburban train service.
171. Relative merits of L-head, T-head, and valve-head gas-engine cylinders.
172. Relative merits of gravity and centrifugal pump-cooling systems for gas engines.
173. Relative merits of ball, roller, and tinkey bearings for heavy vehicles.
174. Relative merits of Evinrude, Cailie, Ferro, and Federal Detachable boat motors.
175. Relative efficiency of oil- and coal-burning locomotives.
176. Long-stroke small-bore versus short-stroke large-bore gas engines.
177. Single- and double-unit lighting systems for automobiles.
178. Turbo-generators versus Corliss engine direct-connected generator unit.
179. Belt versus rope drive.
180. Full floating versus three-quarter and semi-floating rear axles for automobiles.
181. Locomotive headlight turbo-generators.
182. Bessemer versus open-hearth steel.
183. Curtis versus Wright biplanes.
184. Water-tube versus fire-tube boilers.
185. Hot-air versus water house-heating systems.
186. Torpedo boat versus Dreadnaught navy for American coast defense.
187. Engine-power versus horse-power cultivation of land.
188. Air-cooled versus water-cooled gas engines.